The Marin Countywide Plan

Environmental Hazards Element Technical Report #2
Fire Hazards in Marin

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EXECUTIVE SUMMARY

Wildland fires and structural fires in Marin County threaten lives, property, and the natural environment. The Environmental Hazards Element of the Marin Countywide Plan contains policies addressing fire hazards in the County. Since the Element's adoption in 1977, the legal, environmental, and programmatic conditions for fire hazard planning have changed significantly. This report recommends updates to adopted County policy and codes to address these concerns.

The two types of fire hazards in the county and their effects are briefly described below:

Wildland Fires

Marin forest and chaparral areas containing old and highly flammable vegetation have been prevented from burning naturally for as long as 40 years. Many Marin homes face fire risks due to steep sloping, narrow streets, flammable roofing materials, and location at great distances from fire stations.

Ironically, effective fire suppression techniques have increased the likelihood of future uncontrollable wildland fires by allowing the accumulation of ever larger proportions of highly flammable plant materials. Studies of the Mount Tamalpais watershed and the Novato area predict that fires in these areas could cause millions of dollars in private property loss, and cost millions more to suppress.

Residential development patterns in Marin increase the likelihood that homes will be destroyed, since they are frequently located on steep slopes, are poorly addressed, and accessible only by narrow roads. Hill homes may have decks and pole supports which serve to trap heat and wood shingle roofs which catch fire rapidly. Also, these homes are frequently surrounded by highly flammable vegetation.

In the Oakland/East Bay Hills fire (October, 1991), the most costly fire in U.S. history, the physical conditions were similar to those of the densely wooded and steeply sloped residential areas in the State Responsibility Areas of Marin County, such as Tam Valley. Losses from this fire are discussed in Section III.B.4 of this report. Studies of fires in similarly developed areas (e.g. Los Altos Hills, 1985, and Brentwood/Bel-Air, 1985) show that 66% of destroyed homes had wood shingle roofs and were first ignited on the roof. Some 70% of the destroyed dwellings were located within 50 feet of chaparral and 45% of all stilted or cantilevered homes were destroyed.

Structural Fires

Over 3,000 structural fires occurred in Marin between 1978 to 1986, resulting in over $31 million in losses, 179 injuries, and 16 deaths. A 1987 survey of fire departments in the county revealed a preponderance of conditions which increase the risk of loss in unincorporated areas, including: delayed emergency response time to the scene of a fire, inadequate road access, and a poor water supply.

Within the first five minutes of a fire, temperatures can reach 1200° Fahrenheit, high enough to instantly ignite most interior materials. This is why fires outside the five minute response time cause greater damage.

Fire Protection

Sixteen fire protection departments serve the various communities in Marin County and some unincorporated areas. Most have mutual aid agreements with neighboring districts to assist with major fires. The State of California also contracts with the County of Marin to provide fire service outside the city boundaries in the State Responsibility Area.

Fire protection services include a variety of programs and special regulations designed to prevent fires from occurring, such as public education, landscape management, plan checks, and setting special construction standards. The application of fire safety construction standards is inconsistent within unincorporated areas because the building fire safety code of the County is not as strict as the codes of the fire districts and cities. Fire districts are typically asked to comment on a development project which requires a discretionary permit from County Planning. Frequently, compliance with a district's more stringent building standards becomes a condition of project approval.

Fire Hazard Planning

The County has adopted the Multihazard Plan, a checklist for action in the event of a major fire disaster. Such actions include evacuation, communications, and mutual aid.

However, the County's building and subdivision codes do not sufficiently protect the ordinary home from more common fire hazards. The policies and implementation program proposed for amendment to the Environmental Hazards Element of the general plan call for: 1) an ordinance requiring Class-A fire retardant roofing (adopted by the Marin County Board of Supervisors, December 17, 1991); 2) automatic sprinklers for structures outside of the 5-minute response time; and 3) fuel management programs to reduce unnatural build-up of old and hazardous vegetation.

I. PURPOSE

The Marin County Board of Supervisors adopted the current fire hazards component of the Marin Countywide Plan Environmental Hazards Element in 1977. Over the last eleven years the legal, environmental, and programmatic conditions for fire hazard planning have changed, necessitating modifications to the 1977 policies.

II. AUTHORITY FOR FIRE HAZARD PLANNING

The California Health and Safety, Government, and Public Resources codes provide the legislative authority for fire hazard planning in California cities and counties. The California Government Code requires local governments to incorporate a fire hazards section into their local general plan and implementing ordinances. This section must address land use considerations in fire hazard planning. The Health and Safety Code establishes fire hazard severity zones with fire prevention regulations enforced by local governments. The Public Resources Code establishes enforcement authority for local governments to require fuel management programs in their areas.

California Government Code Section 65302 requires local governments to prepare a safety element to the general plan which includes the identification of evacuation routes, peak load water supply requirements, minimum road widths, and clearances around structures. Section 65303 of the Government Code requires the naming of streets and numbering of houses to assist in the identification of burning structures. Section 65451 requires subdivision plans to include building density and water supply availability which can be critical in minimizing fire risks. Section 66479 also provides local governments with the authority to require the dedication of lands for fire stations, subject to certain enumerated conditions.

California Health and Safety Code Section 13108.5 establishes hazardous fire zones for State and privately owned rural and wildland areas designated by the State Board of Forestry as State Responsibility Areas. The State Fire Marshal rates fire hazard zones according to the severity of fire hazards. The State Fire Marshal applies special construction standards to fire hazard zones around the State, including a requirement for fire retardant roofs. The State may contract with local fire authorities to provide services within State Responsibility Areas, as it does in Marin County.

California Public Resources Code Section 4291 provides enforcement mechanisms for requiring fire safety precautions in existing homes in the State Responsibility Area. Amendments to Section 4290 (State Senate Bill 1075, approved in September 1991) provide for enforcement of stringent fire safety regulations in new developments in the State Responsibility Area.

III. FIRE PROBLEMS IN MARIN COUNTY

A. OVERVIEW OF MARIN COUNTY FIRE HAZARDS

Fire hazards in Marin County threaten lives, property, and the natural environment. Prevented from burning naturally for as long as 40 years, Marin forest and chaparral areas contain old and highly flammable vegetation posing significant hazards to scenic environments and residential communities. Many Marin homes face increased fire risks due to steep slopes, narrow streets, flammable roofing materials, proximity to old and overgrown vegetation, and distance from fire stations.

Fire hazards in the county fall into two general categories: wildland fires which emanate from open chaparral, grassland or forest areas and can threaten adjacent residential communities; and structural fires which damage the home or the work place of origin and may spread to other areas. These two categories are discussed separately below.

B. WILDLAND FIRES

Vegetation, weather, topography, and the location of built areas on the edge of wildlands create wildland fire hazards in Marin County. Marin forest, chaparral and grassland areas include a build-up of dry, dead vegetation which provides abundant and highly flammable fuel for wildfires. Hot, dry Marin summers reduce plant moisture and make vegetation more susceptible to burning. Unpredictable winds near the ocean, along ridge lines, and in steep drainages spread wildland fires quickly and erratically by changing fire direction and speed. Steep Marin slopes allow lowland fires to preheat vegetation before climbing hillsides, increasing the rate of fire spread and impeding firefighter access. Many Marin communities located in the urban fringe face risks in the event of a wildfire. These risks are increased by flammable building materials, stilt and pole construction along steep slopes, poor road access, confusing street addresses, and dense vegetation immediately surrounding homes near the wildland. Most of the housing stock in Marin County at risk of wildland fire is located in the State Responsibility Area, under the protection of the Marin County Fire Department.

A major wildfire in Marin would cause significant damage to open areas and private property. Wildland fires in Marin burned over 2250 acres between 1986 and 1990, according to the Marin County Fire Department (see Table 1). A study conducted in 1984, An Assessment of Wildland Fire Potential in the City of Mill Valley and the Tamalpais Fire Protection District (Donald Perry, 1984), predicted that a major Mount Tamalpais fire could cause millions of dollars in private property loss and burn as many as 5,000 acres of scenic open area.

Table 1. Wildland Fires in the Marin County Fire Department Jurisdiction and State Responsibility Area: 1986 to 1990

Year	# of Fires	# of Acres Burned
1986	139	288.5
1987	104	707.5
1988	114	914.5
1989	122	244.3
1990	127	709.5
Total	606	2864.3

Source: Marin County Fire Department, 1991.

A study conducted for the Novato area, Fuels, Environmental, and Fire Behavior Associated with the Wildland Urban Interface of Novato, CA, (Donald Perry, 1983), suggested that a wildland fire in the Novato area could result in damage similar to that caused by a 1981 Napa fire which burned 61 homes, cost close to $36 million in damage, and cost over $1.5 million to suppress.

Certain vegetation, weather, topographical, and residential development, and water supply conditions increase the risk of loss in the event of a wildfire.

1. Vegetation

Wildland fires occurred naturally in Marin County for hundreds of years before the advent of effective fire suppression. Ignited by lightning and humans, these fires cleared accumulated vegetation and regenerated plant communities. Both forests and chaparral required periodic fires to aid mineral recycling of the soil by returning debris to ash, creating better areas for animals to feed, and regenerating trees and shrubs. Some species of Marin plants only germinate following a fire.

Major forest fires occurred in Marin every 20-30 years and chaparral fires more frequently according to a study of fires in Muir Woods ("Fire History and Perpetuation of Natural Coast Redwood Ecosystems," Journal of Forestry, Vol. 83, No. 8, August 1985). Over thirteen fires occurred in the Mount Tamalpais watershed between 1859 and 1945, averaging once every ten years over this period (see Figure 1). Since 1945 there have been no major fires in the Tamalpais watershed.

Figure 1. Partial History of the Watershed Area of Tamalpais: 1859 to 1945

1859	Fire burned on Mount Tamalpais for 3 months.
1881	Bill Williams Gulch Fire: 10 miles long, 6,000 acres. Pixley Fire: Baltimore to Blithedale Canyon toward Corte Madera. 50,000 acres burned.
1891	Fires burned from Eldridge Grade over much of the north side of Tamalpais including Bill Williams Gulch.
1895	Fire in Bill Williams Gulch spread over east and west sides of the canyon. Fire eventually controlled by firefighters.
1899	Fire on south side of Tamalpais spread to Corte Madera Gulch, Boyle Canyon, Blithedale Canyon, and Cascade Canyon. Several structures burned.
1905	Fire from Bolinas area burned east and west sides of Bolinas Ridge.
1906	Fire on north end of Bolinas Ridge.
1913	Fire on Mount Tamalpais south slopes burned area from Kent Woodlands to Muir Woods. 2,000 men on fire line. Mill Valley residents fight fire from their homes. Fire burned for 10 days before controlled.
1916	300 men fight fire on south slope of Mount Tamalpais. Fire burned for 2 days.
1923	Largest fire in recorded Marin history. Area from Ignacio to Woodacre burned and 30 to 40 homes were lost. Fire proceeded to the base of Tamalpais, west to Bolinas Ridge then east towards Mill Valley. Rain eventually controlled the blaze. A 100 square mile area burned.
1929	Fire burned 1000 acres and 100 homes in Mill Valley including area from Blithedale to Throckmorton Ridge to West Point. 2000 to 3000 firefighters on the line.
1945	Last large watershed fire burned area from Kent Lake to south edge of Bolinas Ridge up to the west summit of Tamalpais and to the Cascades in Fairfax.

Source: Marin County Fire Department, 1986.

The relatively recent and effective suppression of fires has interrupted natural cycles of burning and rejuvenation in Marin plant communities. This has allowed a hazardous build-up of plant material and changed the composition of plant communities, permitting the invasion of scrub, non-native plants, and species not tolerant of occasional burning.

Fire suppression has allowed chaparral in the County to age and become a volatile fire fuel. Chaparral becomes highly flammable after 20 years of uninterrupted growth. Much of the vegetation in Marin wildlands exceeds 20 years of age. Vegetation age in Novato and Mount Tamalpais communities is documented in Table 2.

Ironically, fire suppression efforts increase the likelihood of significant damage from eventual wildland fires by allowing the accumulation of vegetation with an ever larger proportion of highly flammable dead and dry plant material. According to a report prepared by the Marin County Open Space District, ("Controlled Burns on District Open Space Lands," November 4, 1986) a summertime fire on Mount Tamalpais has the likelihood of being uncontrollable given existing dead vegetation build-up on Mount Tamalpais.

The build-up of older plant material over time increases the heat output and rate of spread of an eventual wildland fire. For chaparral vegetation in Marin, such as that present in the Novato, Mount Tamalpais, and West Marin areas, the existing accumulation of plant fuel will increase heat from eventual wildland fires and make them more destructive to plant and animal life, placing larger areas of land at risk.

Table 2. Age of Vegetation in Portions of Marin County

Novato Area	
Big Rock Ridge	28 to 31 years
Burnt Ridge	28 to 32 years
Indian Valley	28 to 32 years
Wild Horse Valley	26 years
Bahia	24 to 28 years

Mount Tamalpais Area	
Warner Canyon	25 to 30 years
Blithedale Ridge	28 to 40 years
Fern Canyon	30 years
Tennessee Valley	30 years

Source: Donald Perry, Fuels, Environmental, and Fire Behavior Factors Associated with Wildland Urban Interface of Novato, California, 1983; and An Assessment of Wildfires in the City of Mill Valley and the Tamalpais Fire Protection District, 1984.

A major wildland fire in Marin could cause severe damage to open space and parklands. Fire fighting efforts require bulldozing and road cutting. Rainfall following a major fire would cause severe erosion, landslides and mudslides, further disrupting plant renewal by displacing topsoil and possibly endangering roads and homes.

A major wildland fire would threaten residences located near forest, brush, or grassland areas. Many Marin homes are located in semi-rural areas surrounded by trees and brush. This dry natural cover can set a home on fire in the event of a major wildland fire or can rapidly spread a residential fire to surrounding areas.

2. Weather

Seasonal climate conditions contribute to Marin fire hazards. Air temperature and relative humidity affect fuel moisture, suppressing fires during much of the year and encouraging fire spread during the summer and early fall. Winds propel a spreading wildfire, as was seen in the Oakland/East Bay Hills fire that initially spread the length of a football field every minute. Erratic changes in wind speed and direction characteristic of the San Francisco Bay Area produce unpredictable fire patterns in Marin County. In the Tamalpais area, the marine influences of the San Francisco Bay and the Pacific Ocean maintain moisture levels which discourage wildland fires yet create erratic winds which can spread wildfires rapidly (Perry, 1984).

3. Topography

Marin's diverse topography affects fire conditions in each area of the County. Areas with steep slopes face greater fire risks. The rate of fire spread roughly doubles as the slope percentage doubles, since wind drafts on slopes preheat vegetation allowing fires to move more rapidly.

Marin slopes may be as steep as a 100% grade, as in Fern and Cascade Canyons near Mount Tamalpais. Many areas are virtually inaccessible to fire safety personnel due to the narrow width of fire roads and the dense vegetation surrounding them. Slope conditions following a fire/flood sequence would produce major mudslides in Fern and Cascade Canyons, Blithedale Ridge, and Homestead Valley (Perry, 1984).

Steep and broken terrain creates wind eddies, or erratic wind flows, making fire behavior erratic and more difficult to combat in the County, particularly near Novato. Winds on Big Rock Ridge, Burnt Ridge, and Burdell Mountain pose significant problems for fire fighters (Perry, 1983).

4. Patterns of Residential Development

Residential development patterns in Marin increase the likelihood that homes will be destroyed in the event of a wildland fire. Many Marin homes are located on the fringe of wildland and brush areas. These homes may be located on steep slopes, accessible only by narrow roads which are poorly addressed. Hill homes may have decks or pole supports which leave large floor areas suspended to trap heat, increasing opportunities to ignite the home. Also, homes in Marin County wildland areas commonly have wood shingle roofs which catch fire rapidly. Homes are often surrounded by highly flammable vegetation which facilitates the spread of wildfires into residential areas.

The role of residential development patterns in increasing the costs of a fire is illustrated in examples of wildland fires which have attacked California communities unexpectedly. The October 1991 fire in the Oakland/East Bay Hills destroyed 2,630 homes and 456 apartment units, and damaged 304 homes (Report from the Oakland City Manager, October 29, 1991). More than twenty-five people were killed by the fire and 150 were injured. Preliminary estimates of property loss exceeded $1.5 billion (per the Oakland City Manager's office - three weeks after the fire). The firefighting costs exceeded $3.4 million for the City of Oakland and $4.2 million for the mutual aid effort.

The July 1985 Los Altos Hills fire which burned 150 acres, destroyed 12 homes, injured 10 firefighters, and caused an estimated $9 million in damage, occurred in a Northern California community not far from Marin. Much of the damage caused by the blaze was attributed to hazardous residential development patterns. A study conducted by a Los Altos task force found that the presence of uncleared brush and grasses near homes, the preponderance of wood shake roofs, and failure to adequately maintain fire roads all contributed to disaster losses.

Similar conclusions were drawn by The National Foundation for Environmental Safety Newsletter which described the 1985 Brentwood/Bel-Air wildland fire that destroyed 484 homes. The study identified the following patterns in the coastal Bel-Air community fire.

a. 75% of the buildings destroyed had wood shingle roofs.

b. 66% of all dwellings which sustained any damage were first ignited on the roof.

c. 70% of all dwellings destroyed were located within 50 feet of chaparral.

d. 45% of all stilted or cantilevered homes were destroyed.

e. With a 100 foot brush clearance, homes with a wooden roof had a 21 times greater chance of burning than homes with non-wood roofs.

f. Natural or man-made barriers such as firebreaks were incapable of interrupting the forward progress of fire burning in old age chaparral under severe fire weather conditions.

The conditions which contributed to the Oakland/East Bay Hills, Los Altos Hills, and Bel Air fires exist presently in Marin County. At the time this technical report was written, detailed statistics on and analysis of the Oakland/East Bay Hills fire was not available.

A Planning Department survey of Marin County Fire Departments conducted between June and October of 1987 identified: 1) poor access; 2) the presence of wood shake roofs in many areas; and 3) lack of brush clearance around structures as the most serious wildland fire hazards facing several different Fire Protection Authorities around the County. Fire District officials in Marinwood, Ross Valley, and the County Fire Department in particular identified the prevalence of wood roofs as a significant fire hazard in their districts.

The 1984 Perry study of the Mount Tamalpais area identified the following wildland/urban interface fire hazards specific to the Tamalpais area:

> Narrow/winding roads are surrounded by dense overhanging vegetation which impede firefighter access.
>
> Minimal water pressure flows.
>
> Poor addressing in much of the area.
>
> Homes in the area are primarily wood construction with wood shake roofs. Many homes are located on sloping hills with wood deck overhangs which are extremely dry due to decades of exposure. Brush and trees closely surround homes.

The 1983 Perry study of the Novato area also found residential development patterns which increase the risk of serious losses in the event of a brush fire. A majority of the homes in the Bahia, Blackpoint, Greenpoint, Indian Valley, and Wild Horse Valley areas are wood construction with shake roofs and little brush clearance. Some of these areas are difficult to reach due to narrow winding roads and distance from fire stations.

5. Access to Water

The safety of water pumping stations is of critical importance to firefighting efforts in a wildland fire. Pumping stations were destroyed by the Oakland/East Bay Hills fire, which reduced the firefighting capability. Some pumping stations in the Marin Municipal Water District are housed in wood structures that are vulnerable to fire. The pumping stations and power to them are subject to exposure by fire. The County Fire Department is working with the MMWD to identify inadequacies and vulnerabilities and to correct them. In addition, an increase of homeless people are living in the MMWD watershed area, adding to the risk of wildland fire caused by campfires and arson.

C. STRUCTURAL FIRES

All buildings including homes, businesses, and recreational facilities face structural fire risks. The risk of damage to homes and businesses from fire is in part determined by the adequacy of road access, length of time required for firefighters to arrive at the site, and the availability of adequate water supply. Current roadway and water supply conditions contribute to the level of structural fire risk in Marin County.

Structural fires in Marin between 1978 and 1986 caused $23 million in structural and $10 million in content damage to homes in the County. These fires also injured 179 people and caused 16 deaths (see Table 3).

The lack of adequate water supply for fire fighting and poor access to structures may increase fire losses. A survey of fire departments in the County conducted from July to September of 1987 revealed the presence of conditions which increase the risk of losses from structural fires in Marin unincorporated areas. Existing conditions contributing to risk of loss in Marin structural fires include: 1) response time to the scene of a fire; 2) inadequate road access; and 3) poor water supply.

1. Response Time

Five minutes after the outbreak of a structural fire, temperatures reach a level causing significant damage, making lengthy response times a significant fire hazard. Within the first five minutes of a fire, temperatures cause instant combustion of building materials and furnishings, or "flashover," significantly damaging structures and their contents. Buildings outside the five minute response time are virtually guaranteed loss in the event of a structural fire, and greater losses than structures within the five minute response time.

Table 3. Structural Fire Incidence in Marin County: 1978 - 1986

Year	Number of Fires	Structure Loss ($)	Content Loss ($)	Firefighter Injuries	Firefighter Deaths	Civilian Injuries	Civilian Deaths
1978	353	$ 1,652,010	$ 818,145	13	1	15	2
1979	445	3,320,661	1,100,811	14	0	9	4
1980	390	2,309,820	632,070	8	0	13	0
1981	365	2,473,685	1,751,841	6	0	10	3
1982	347	1,994,391	1,054,375	20	0	6	2
1983	266	2,482,086	1,156,152	9	0	5	2
1984	290	3,741,695	1,977,751	10	0	6	2
1985	303	2,031,930	525,221	5	0	10	0
1986	320	3,206,299	935,355	11	0	9	1
Total	3,079	$23,212,577	$9,951,721	96	1	83	16

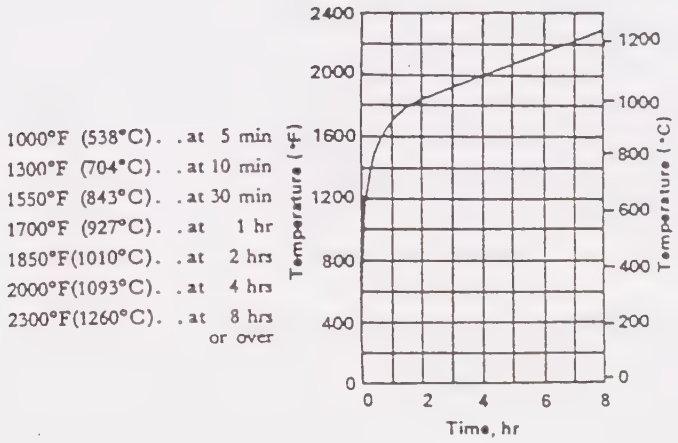
Source: California State Department of Forestry, 1987

The importance of fighting a fire within the first five minutes is illustrated in Figure 2, "The Time-Temperature Curve." This figure points out that within five minutes, structural fires reach 1200° Fahrenheit. These temperatures are high enough to instantly ignite most interior materials. The ignition temperature of wood is 508°, cotton is 410°, and synthetic fiber is 600° degrees.

At 1000° F, thermal radiation feedback from building ceilings and upper walls heats the contents of the fire area and brings combustibles to their ignition temperature. At this temperature, simultaneous ignition of interior finishing, furniture, and draperies occurs increasing the likelihood of fire spread to other areas, releasing potentially toxic fumes, causing substantial damage to the structure and contents, and threatening adjacent structures (National Fire Protection Association, "Building Construction and Materials, Section 2-1.1.). Because fires allowed to burn more than five minutes result in significant damage, lengthy response times caused by poor road access, unclear addressing, or distance from a fire station pose significant risks to lives and property.

Many Marin structures lie outside a five minute firefighter response time. A study of fires occurring between 1981 and 1985 in the Marin County, Novato, Inverness, and Alto-Richardson Bay Fire Departments, conducted by the County Planning Department, found that 133 out of 406 fires between 1981 and 1986 in selected fire districts were beyond a five minute response time. The survey also found that fires occurring in areas beyond a five minute response time caused greater damage than fires within the five minute response area.

Figure 2. The Time Temperature Curve



Source: National Fire Protection Agency, Building Construction Materials, 1985.

Over the period studied, 406 commercial and residential fires occurred. Of these, 273 were reached within five minutes of the call for assistance and 133 were beyond the five minute response time. Damage from fires reached within five minutes included a total of $1,317,535 in property damage and $399,740 in content damage, or an average of $6,290 per fire. Fires outside the five minute response time caused $1,614,120 in property damage and $373,425 in content damage for an average of $15,000 per fire.

Over a six year period, the 133 out of a total 406 fires which occurred outside the five minute response time caused greater average and total damage than fires within the five minute response time. These figures clearly demonstrate that fires outside the five minute response time have caused greater damage than those a shorter distance from fire assistance. (Note: a single $2 million commercial building fire in the urban area which occurred in 1986 was not included in the survey results cited above because it was much larger in magnitude and dollar damage than other incidents reported.)

2. Road Access

Lengthy response times in different areas may be caused by distance from a fire station or poor road access. Firefighters identified poor roads as an important contributor to lengthy response times in the survey of Fire Districts conducted by the County Planning Department. Off-road vehicle and visitor parking on fire or narrow roads also impede public safety vehicle access to residences and rural areas. Firefighters in the County also noted that roads are too narrow in some areas and the turning radius inadequate for fire safety vehicles.

3. Water Supply

Water supply availability concerns firefighters in Marin. According to fire officials in the Tamalpais Fire Protection District, water supply for fighting structural fires may prove inadequate depending on the size of the fire. The 1984 Donald Perry study of the Tamalpais area stated that the water system in the Mill Valley/Tamalpais area had minimal pressure flows making the fire hazards in this area even more serious. Fire officials for the City of San Rafael and Ross Valley also identified the lack of water supply as an important fire hazard in the unincorporated areas they serve.

IV. FIRE PROTECTION MEASURES IN MARIN COUNTY

A. MARIN COUNTY FIRE DEPARTMENT AND PROTECTION DISTRICTS

The County of Marin, Fire Protection Districts, Community Service Districts, and Marin cities coordinate fire protection services for the unincorporated Marin communities.

The State of California contracts with the County of Marin to provide fire service for the large portions of the unincorporated county falling within the State Responsibility Areas (see Map 1). This area includes most of the inland rural and coastal portions of the County as well as several urban area communities including Homestead Valley, Kentfield, Lucas Valley, Marin City, Marinwood, portions of Santa Venetia, and Tamalpais Valley. The County Fire Department enforces the provisions of the Public Resource Code (PRC) Section 4290 (for new construction) and Section 4291 (for existing development) requiring strict fire safety standards in the State Responsibility Area. The County coordinates with the fire districts to enforce these sections of the PRC within the unincorporated portions of the State Responsibility Area.

Fire protection service in Marin County includes response to incidents as well as a variety of programs and special regulations designed to prevent fires. Fire prevention activities include public education, landscape management programs, plan checks, and setting special construction standards. Prevention is steadily becoming recognized as the means for preparation and prevention of a catastrophic event. The Fire Prevention Bureau needs additional staffing and resources devoted to public education and awareness, enforcement, and investigation. Currently, the County Fire Marshal is the only staff member responsible for conducting fire prevention activities.

Several cities and a few fire districts have stringent fire safety regulations, such as a requirement for automatic sprinklers in buildings outside a five minute response time. A more complete description of special district standards is provided in Appendix 1.

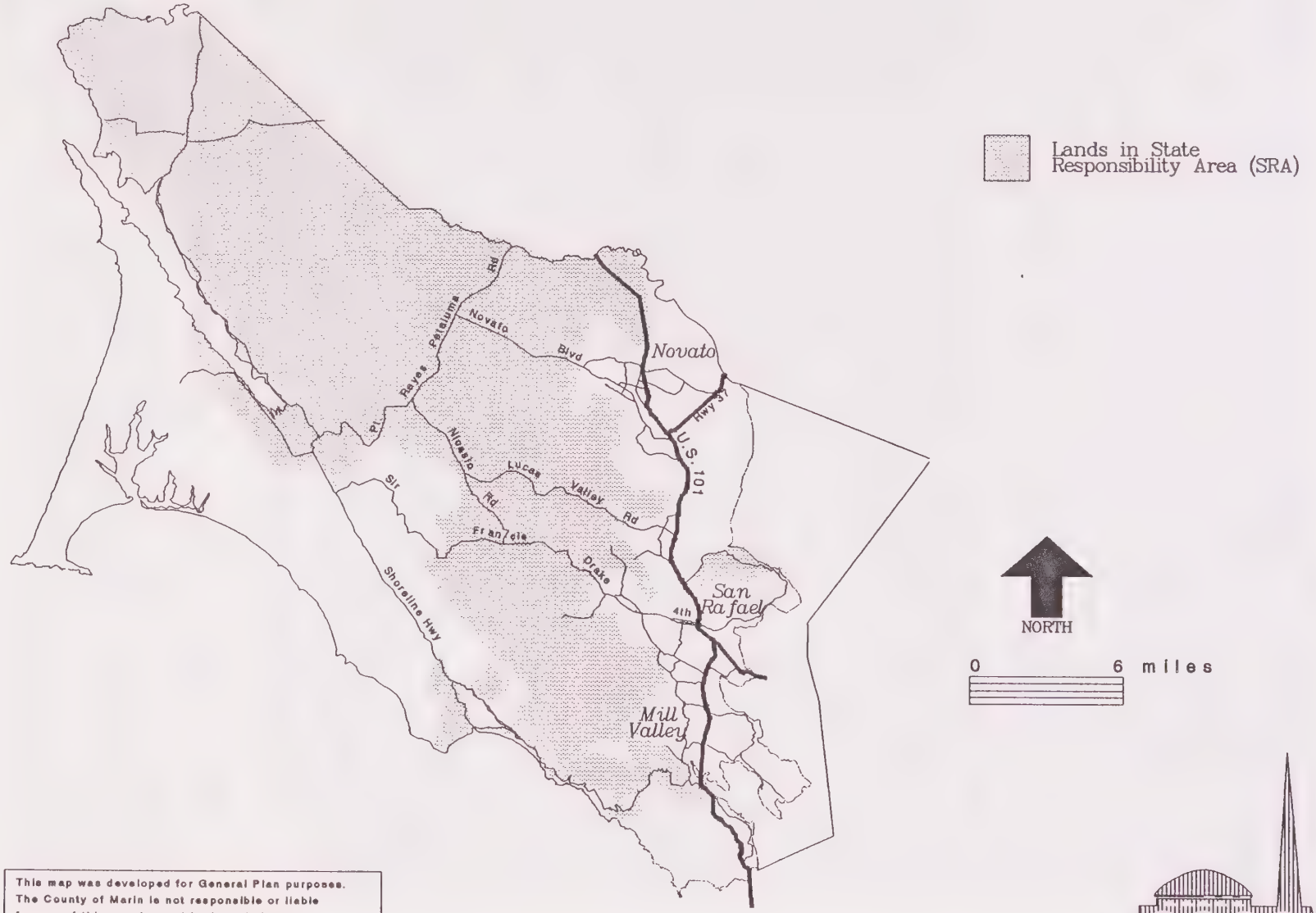
The County of Marin Fire Department has an aggressive fire safety program enforcing the provisions of PRC 4291, called the "green card" program, in which (green colored) fire safety checklists are sent to all residential property owners in the State Responsibility Area. The property must meet minimum fire protection measures specified on the card, such as a 30 foot clearance, screen on chimney, and street address. In 1991, approximately 60 violators were cited $95. The County Fire Marshal expects to issue two to three times as many violations in 1992 and he will assist the fire districts in enforcing safety measures.

B. CONSTRUCTION STANDARDS

1. Uniform Fire Code

The Uniform Fire Code, Marin County Code Title 16, adopts the 1988 edition of the Uniform Building Code recommended by the Western Fire Chiefs Association and the International Conference of Building Officials. In addition to the Uniform Building Code Requirements, this section of the County Code specifies the following building requirements for fire safety:

Map 1. State Responsibility Areas in Marin County



a. States that the Chief will designate fire appliances to be installed according to the severity of probable fire;

b. Requires residential smoke alarms for all single and multiple family homes sold or significantly repaired;

c. Requires permits for outdoor burning;

d. Prohibits the storage above ground of flammable and combustible liquids unless authorized by Fire Department permit;

e. All newly constructed buildings must post addresses so that they are visible from the street or road fronting on the property.

For new residential or commercial construction in rural areas outside a water district jurisdiction, the County Fire Department requires a minimum 3,000 gallon water storage tank and a fire hydrant located within 350' of the development.

2. Uniform Building Code

The Marin County Building Code, Title 19, adopts and makes exceptions to recent editions of the Uniform Building Code for commercial and residential buildings (1988 commercial and residential). The Title also adopts recent editions of the Mechanical, Housing, Electrical, Plumbing, Pool, and Solar Energy Codes. The Chief Building Inspector enforces the provisions of the building code and cooperates with the County Fire Department in enforcing local ordinances relating to automatic fire alarms and extinguishing equipment, the storage and use of flammable material, and in inspecting burned structures for structural integrity and any hazards which would cause injury.

The County's Building Code specifically establishes building standards to reduce fire hazards in unincorporated Marin in the following areas. The Code:

Defines a hazardous building and "attractive" nuisances which shall be abated; and,

Requires building plans to meet fire resistive requirements (e.g. resistive materials for exterior walls, common walls and safe egress from upper floors).

3. Fire Protection District Standards

Fire-related building standards for structures in Marin cities, towns, and unincorporated areas differ among jurisdictions. Some cities and towns require fire retardant roofing and residential automatic sprinklers through city-adopted ordinances. Building standards not included in local government codes may be suggested by local fire officials in response to individual development applications.

Fire districts in unincorporated Marin comment on discretionary development applications when these are referred by local planning departments. In the case of discretionary permits, conditions suggested by fire officials are usually incorporated into the conditions of approval of the development project.

a. Fire Retardant Roofing

The Uniform Building Code reports the results of independent research on the fire retardant nature of available roofing materials (UBC Section 3202). Fire retardant roofing materials are classified according to their resistance to fire exposure as follows:

Class A — Resists severe exposure. Includes fiberglass, clay, concrete, perlite, tar and gravel, and coated steel.

Class B — Resists moderate exposure. Includes coated steel, pressure treated cedar, and tar and gravel.

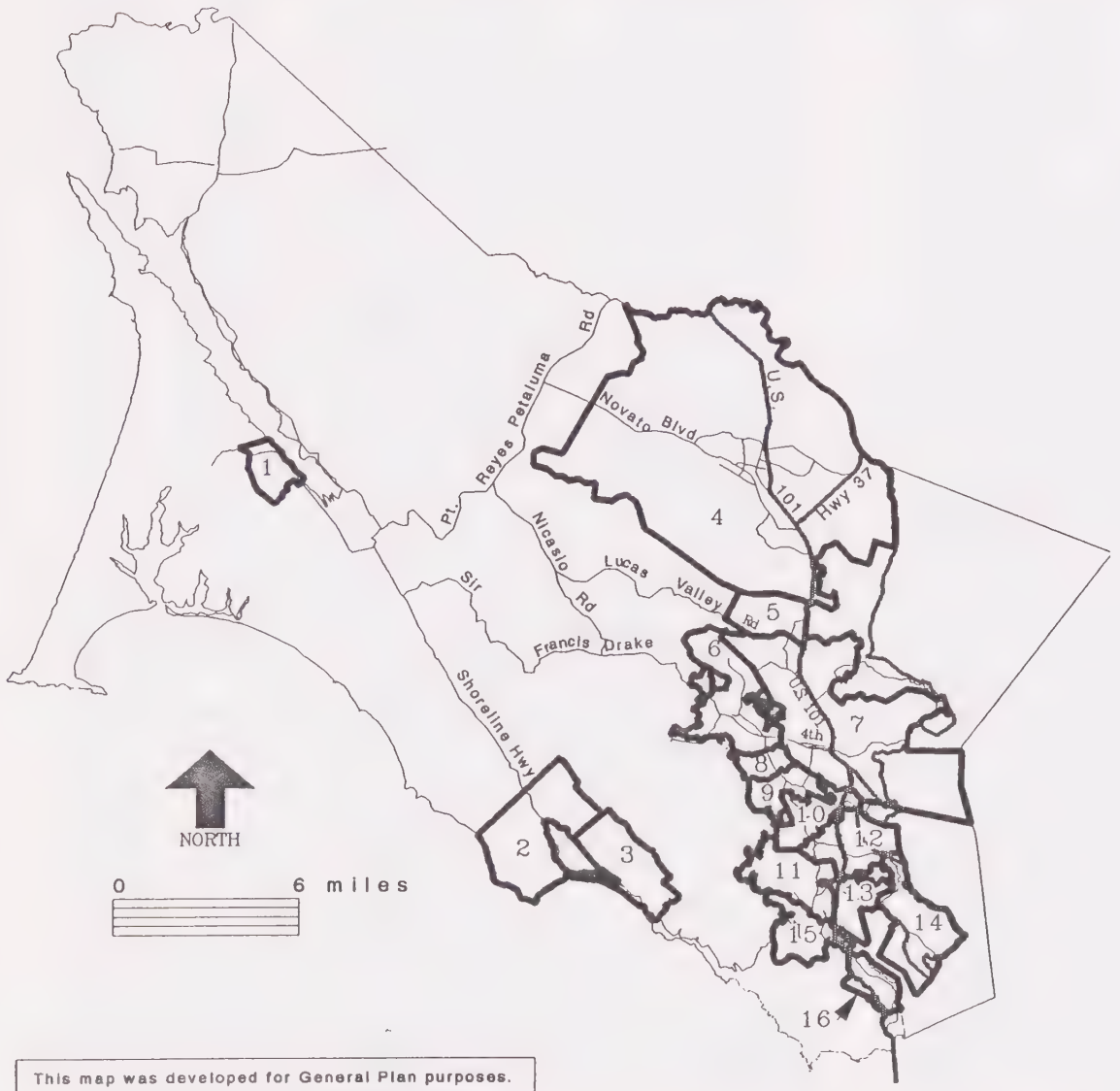
Class C — Resists light exposure. Includes coated steel, pressure treated cedar, and gravel, and treated aluminum.

On December 17, 1991, the Marin County Board of Supervisors adopted an ordinance requiring Class A fire retardant roofing for all new commercial and residential construction in the unincorporated area of the county. The ordinance also requires an upgrade to Class A roofing when more than 50% of a structure is remodelled.

b. Automatic Sprinklers

Automatic sprinklers for residential and commercial development prevent structural fires from causing significant damage. This can be particularly important in structures beyond a five minute response where significant losses would otherwise occur. Sprinkler systems are estimated to cost $1.50 per square foot of living area, which could potentially add $3,000.00 to the cost of a 2,000 square foot home.

Map 2. Fire Protection Districts in Marin County



This map was developed for General Plan purposes. The County of Marin is not responsible or liable for use of this map beyond its intended purpose.

LEGEND

1. Inverness Public Utilities District
2. Bolinas Fire Protection District
3. Stinson Beach Fire Protection District
4. Novato Fire Protection District
5. Marinwood Community Services District
6. Ross Valley Fire Department
7. San Rafael Fire Department
8. Ross Fire Department
9. Kentfield Fire Protection District
10. Larkspur Fire Department
11. Mill Valley Fire Department
12. Corte Madera Fire Department
13. Alto-Richardson Bay Fire Protection District
14. Tiburon Fire Protection District
15. Tamalpais Fire Protection District
16. Sausalito Fire Department

Marin County Planning Department

Declining costs and increased reliability make sprinklers a sensible and popular fire safety device. Insurance carriers often provide discounts of 5% to 13% to homeowners with sprinklers, according to the National Fire Protection Association. The UBC allows for reduction in fire restrictive walls when sprinklers are installed. Uniform automatic sprinkler requirements also provide homeowners with the assurance that their property and safety will be protected in the event of a fire, even if they live at some distance from a fire station.

The Marin Fire Chiefs Association unanimously endorsed a uniform countywide automatic residential sprinkler system requirement for new buildings beyond a five minute response time in 1979. Several Marin cities and towns now require residential sprinklers including Corte Madera, San Rafael, Sausalito, and Tiburon.

Several fire districts in the County regularly recommend sprinklers as conditions of development approval (Alto-Richardson Bay, Inverness, Marin County, Ross Valley, and Tamalpais). Some districts have expressed an interest in countywide adoption of a sprinkler requirement that would uniformly require these safety devices in new structures.

c. Land Management/Weed Abatement

The proximity of dry vegetation to developed areas poses one of the most significant fire hazards in the County according to fire protection authorities. The County and most of the fire protection districts, consequently, conduct special land management/weed abatement education and ground clearance programs to reduce this fire hazard. Educational programs range from elementary school fire awareness to notices encouraging homeowners to reduce dangerous vegetation around their homes.

Some districts require brush clearance or weed abatement and levy fines for non-compliance (Marinwood CSD, Mill Valley, Novato, Ross Valley, San Rafael, Tamalpais, and Tiburon). The City of Novato general plan requires all new subdivisions to submit a land management plan which details proposals for reducing brush hazards and incorporating fire resistant landscaping.

The Tamalpais and Novato Fire Protection Districts are also exploring fuel management in areas with decades-old accumulation of flammable vegetation, in order to reduce the threat of a serious wildland fire spreading out of control.

Consistent with Article 5 of PRC 4290, the County and fire protection districts area encourage planting of fire breaks of fire resistant plant material around residential areas.

C. MULTIHAZARD PLAN GUIDELINES FOR FIRE DISASTERS

The Marin County Department of Emergency Services is preparing a comprehensive disaster plan for the County of Marin which includes contingency plans for wildfire and urban fire emergencies. The County Board of Supervisors approved the first part of the plan, "Multihazard Plan, Part A" in September of 1986 (Marin County Resolution 86-319, 1986, Marin County Code 2.99). Parts Two and Three of the Multihazard Plan, required disaster management operations and responsible agencies, was completed in 1988.

The Multihazard Plan addresses Marin County's response to extraordinary emergency situations and focuses on large-scale disasters which pose a major threat to life and property. The plan also outlines emergency conditions, agencies responsible for responding to emergencies, hazard mitigation measures, mutual aid agreements, and checklists for action in the event of an emergency.

Designated Marin County officials have authority to activate the Plan and may declare a local emergency if necessary. Public officials coordinate emergency response from a central Emergency Operations Center (EOC), located in the County Hall of Justice.

The Multihazard Plan discusses wildland fires in Appendix A-5. "Response to Wildfire" outlines actions for officials in the event of a major wildfire including the establishment of an independent command post, evaluation of extent of fire, evacuations, traffic control and transportation of supplies and equipment, requests for mutual aid, emergency public information including evacuation instructions and media announcements, and provisions for return home travel.

The Marin County Fire Department is responsible for coordinating mutual aid efforts during a wildland fire. However, the firefighting capabilities of the mutual aid effort in a wildland fire could be impaired by the Department's antiquated communications equipment and inadequate space for exercising administrative duties. In order to carry out its coordinating role, the Department needs capital improvements, including expansion of headquarters space and acquisition of redundant consoles with additional dispatch staff to operate the consoles in the Emergency Command Center.

Appendix A-6, "Response to Urban Fire," outlines required actions and responsibilities to be taken in the event of a major urban fire, such as maintaining communications with fire officials on-site, evacuating, establishing access and traffic control, determining if a hazardous materials team response is required, requesting mutual aid, informing the public, and providing for reentry of evacuated areas.

V. STATUS OF THE 1977 ENVIRONMENTAL HAZARDS ELEMENT

The Fire Hazards policies of the 1977 Environmental Hazards Element have been partially implemented. This section reviews fire hazard policies and the programs which realized them.

Policy C-3.1

The County should undertake a program of identifying and mapping extreme fire hazard areas. The State of California Department of Forestry studied and ranked Marin County fire hazards in the State Responsibility Area in a 1983 study "Instructions for Zoning Fire Hazard Severity in State Responsibility Areas in California." The study defined fire hazards in all of the Marin State Responsibility Area (SRA) as moderate, requiring at least a Class C fire retardant roofing material for all development in the SRA effective July 1, 1988. The Tamalpais Fire Protection District with the City of Mill Valley and the Novato Fire District conducted studies of fire hazards in their areas (Perry 1983, 1984). Studies and maps for the remaining unincorporated have not been completed.

Policy C-3.2

Land development and residential building permit applications should be referred to the County Fire Department or pertinent local fire districts for review and recommendation. All discretionary permits affecting properties in the County unincorporated areas are transmitted to relevant fire protection districts by the County Planning Department (including design review, use permits, and variances). Authorization for these practices exists in Marin County Code sections 16 (Fire), 19 (Buildings), 20 (Subdivisions), and 22 (Planned Districts). Building permits are not routinely referred to local fire districts, although a list of pending permits is available for review at the County Administration Building.

The conduct of building permit review is left to the discretion of the individual fire protection districts. Only the Marin County Fire Protection District (located in the same office building as the Land Development Division of the Department of Public Works where building permits are processed for the County) regularly reviews building permits within its jurisdiction because they have ready access to

building permit records kept in the County Administration Building. Most of the other fire protection districts serving unincorporated Marin do not have the same easy access and are not able to consistently review permit applications. The lack of a convenient system for fire district review of building permits generates confusion between land development and planning staff and the fire districts, resulting in new residential development which has not been reviewed in advance by the relevant fire authorities.

Policy C-3.3 **New subdivisions and land divisions in areas identified as having extreme fire hazards** should only be allowed where it is determined that adequate on- or off-site fire suppression water supply is or can be made available. For residential subdivisions, access should be provided from more than one source where feasible. Fire trails and fuel breaks should be required to be constructed where necessary as a mitigation of excessive risk if at all possible. If development is to occur in extreme fire hazard areas, fire resistant materials, clearances from structures, and landscaping with fire resistant plants should be required.

The County does not have codified requirements for high fire hazard areas beyond basic fire and building code standards. Fire Marshals for the Fire Districts serving the County may recommend construction standards in fire hazardous areas, but the County does not consistently withhold permits based on lack of compliance with a fire safety recommendation.

Policy C-3.4 **The Marin County Fire Department, or other local fire protection agencies** in concert with the Division of Forestry and the National Park Service, shall encourage and promote the maintenance of existing fuel breaks and emergency access routes for effective fire suppression. While normal operational coordination exists for the maintenance of fuel breaks and fire suppression, no specific procedures exist in this area.

Policy C-3.5 **The Board of Supervisors and the appropriate County agencies** and all other agencies having fire protection responsibilities should continue to implement the latest Uniform Fire Code and Public Resources Code. Most districts in the County apply the most recent Uniform Fire Code Standards.

APPENDIX 1. SURVEY OF MARIN COUNTY FIRE PROTECTION DISTRICTS

During the summer of 1987, Marin County planners conducted a survey of Marin County Fire Protection Districts and incorporated fire departments. Each district provides fire service to Marin homes and businesses including fire fighting, public education to prevent fires, identification of fire hazards, and programs designed to reduce fire hazards. The activities of each fire district in Marin County are described below.

1. Alto-Richardson Bay Fire Protection District

The Alto-Richardson Bay Fire Protection District serves the unincorporated communities of the Richardson Bay area. The District works with homeowners' associations to present an annual earthquake day, teach CPR, send flyers to residents with fire safety tips several times each year, and conduct "learn not to burn" and fire drill programs with the local schools. The district is presently considering a sprinkler requirement for all new structures in the district to reduce the level of damage caused by fire outbreak before the arrival of firefighters, particularly for areas outside a five minute response time. Sprinklers are especially important in times where reduced tax revenues affect the ability of jurisdictions to staff and equip the stations.

2. Bolinas Fire Protection District

The Bolinas Fire Protection District is a volunteer District serving the unincorporated community of Bolinas. The District makes fire safety presentations to students at Bolinas School twice a year, sponsors a fire safety contest for children, and places notices in local papers during high hazard seasons. The District considers the downtown area to be particularly hazardous because it contains a number of old wood frame buildings located close to one another. The District is beginning to develop a series of pre-fire plans for each commercial building to help prevent serious fires.

3. Corte Madera Fire Department

The Corte Madera Fire Department serves the Town of Corte Madera and a small unincorporated portion of Lucky Drive. The Department mails fire safety information to the public and conducts a door-to-door fire safety educational program for homes in wildland areas. Wildland fires pose the most significant fire hazard in Corte Madera, where access is poor and many homes are built into the trees and brush. Corte Madera requires fire retardant roofing, automatic sprinkling systems for buildings beyond a five minute response time, and a variety of other building standards designed to provide maximum protection against the risk of fire losses.

4. Inverness Fire Department

The Inverness Fire Department, composed of volunteers, serves unincorporated Inverness. The department distributes public information about fire safety and conducts courses in CPR and fire safety for children. The Department makes recommendations for improving fire safety in new construction to the County Planning and Building departments, occasionally recommending fire retardant roofing and sprinklers.

5. Kentfield (no survey)

6. Larkspur Fire Department

The Larkspur Fire Department serves the city of Larkspur. The Department conducts home safety and grade school "learn not to burn" courses and conducts home safety inspections upon request. Larkspur adopted residential smoke detector and fire retardant roof requirements to reduce the risks associated with fires in the home.

7. Marin County Fire Department

The County Fire Department serves unincorporated areas not served by other fire authorities including portions of Mount Tamalpais, portions of Big Rock Ridge, and the entire State Responsibility Area for Marin County. Along with his other responsibilities, the County Fire Marshal is responsible for fire prevention programs, including plan checks and presentations for school children and homeowners living in wildland areas.

Fire hazards reported by the Department include the buildup of vegetation posing a serious fire threat to nearby developed areas. New construction activity in some areas may strain water supplies in the event of a fire. House addressing systems in portions of the County are unclear and confusing for firefighters.

8. Marinwood and County Service Area 13

The Marinwood Community Service District provides fire protection to the Marinwood/Lucas Valley area. The District conducts public education classes in CPR, First Aid and fire safety. The district also works with several other districts on a fire safety day for the county. Fire problems identified in the District include the presence of flammable brush and grasses near developed areas and the number of homes with wood shake roofs. The District requires fire breaks behind homes and conducts weed abatement/roof cleaning campaigns including a letter from the fire chief distributed to all homes to encourage residents to reduce fire hazards.

9. Mill Valley Fire Department

The Mill Valley Fire Department serves the City of Mill Valley. The Department makes "learn not to burn" presentations to public schools and coordinates a fire prevention week to educate the public about fire safety. The Department identified most canyon areas as particularly hazardous areas due to poor road access, steep slopes, and long response times to reach many homes. The Department also cited proximity to the Golden Gate National Recreation Area, with its large expanses of thick vegetation as posing a fire hazard to Mill Valley residents. The Department conducts a weed abatement program in order to control the proliferation of dangerous vegetation which increases fire risk in the area.

10. Novato Fire Protection District

The Novato Fire Protection District provides fire service to the City of Novato and nearby unincorporated communities. Novato provides fire safety education for residents through film and video presentations made to groups within the district several times each year. Novato also engages in controlled burning of wildland areas to reduce the amount of fuel buildup in open areas which increases the risk of fire spread and damage. The District requires large developments within their jurisdiction to remove dead vegetation periodically.

District personnel canvass hill and canyon areas each year urging residents to remove weeds, brush and tree overhangs from around their homes.

11. Ross Fire Department

The City of Ross Fire Department serves incorporated Ross. It conducts grade school fire safety courses. The Department has identified the wildland interface and the potential for a hazardous materials spill on Sir Francis Drake as the most significant fire hazards in the area. The Department relies on Standard Oil in Richmond for hazardous materials fire fighting equipment.

12. Ross Valley Fire Authority (Including Sleepy Hollow)

The Ross Valley Fire Authority provides service to the community of Sleepy Hollow and nearby unincorporated areas. The Authority conducts informational programs for all homes bordering open space areas and works with the public schools on their "learn not to burn" program. The Authority conducts an annual grass and brush clearance program for homes near wildland areas.

Fire hazards within the Ross Valley area include the growth of combustible vegetation near improved areas; lengthy response times to fires in many areas; blockage of fire roads by off-road vehicles; and a lack of uniform requirements for fire retardant roofing and sprinklers for residences located at a distance from a fire station.

13. San Rafael Fire Department

The City of San Rafael Fire Department serves the City of San Rafael and unincorporated areas around the city. The Department conducts public education programs, including joint sponsorship of Countywide Fire Prevention Week, and a public education presentation delivered several times throughout the year.

The City identifies most of the County unincorporated areas served by the San Rafael Fire Department as high hazard areas due to the interface between developed areas and hazardous brush filled wildlands, and the lack of adequate water supply. In order to mitigate these hazards, the City of San Rafael requires fire resistant roofing, vegetation control, standards for road access to structures including road grades and turning radii, the upgrading of water supply, and the installation of automatic smoke alarms and sprinklers.

14. Sausalito Fire Department

The Sausalito Fire Department serves the City of Sausalito. The Department's public education projects include earthquake preparation, CPR, and home safety presentations. Narrow streets pose the most significant fire hazard, which the district is combatting by purchasing smaller, European pump trucks.

Another problem identified by the district is the lack of uniform automatic sprinkler system requirements in the County, and the fee penalty system enforced by the Marin Municipal Water District which discourages the voluntary use of sprinklers. MMWD charges a standby water supply fee for buildings with sprinklers, a fee which does not represent the amount of water saved by using sprinklers to control fire spread.

15. Tamalpais Fire Protection District

The Tamalpais Fire Protection District serves unincorporated areas near the City of Mill Valley, including Tamalpais and Homestead Valley. The District's education programs include fire safety classes, and notices in local papers about the extent of fire hazards throughout the year.

The District identified the potential for wildland fires due to poor access to many developed areas, poor water availability, and the proximity of brush and vegetation to homes as a serious fire hazard. These conditions are exacerbated by the parking patterns along many of the most narrow streets where double parking or illegal parking is common and prevents safety vehicle access.

The Department engages in weed abatement, posts no parking signs, and encourages the County to require fire retardant roofing in the Tamalpais area.

16. Tiburon Fire Protection District

The Tiburon Fire Protection District services the Town of Tiburon and unincorporated communities on the Tiburon peninsula. The District coordinates with the Corte Madera and Alto Richardson fire districts for service in the areas near Highway 101.

The District conducts weed abatement programs every spring, works with homeowner groups on fire safety, conducts home safety inspection programs on request, and conducts regular inspections of all structures other than single family homes. The District's educational programs include "learn not to burn" activities in the schools, earthquake safety drills, and CPR, and First Aid courses.

Fire hazards identified by the district include poor access to many areas and hazardous structures along Tiburon's Main Street. The District addresses these conditions by requiring sprinklers in all new construction within the district and the installation of sprinklers in existing structures when property is sold. Tiburon also requires fire retardant roofing for new construction.

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List of People and Agencies Contacted

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